27. An eukaryotic expression vector, comprising a nucleic acid encoding human serum transferrin linked to appropriate genetic regulatory elements for expression in an eukaryotic cell.

28. An eukaryotic expression vector, comprising a nucleic acid encoding a human serum transferrin half molecule comprising at least the binding domain of a single lobe of transferrin linked to appropriate genetic regulatory elements for expression in an eukaryotic cell.

29. An eukaryotic expression of vector of claim 27 or 28, wherein the vector includes a nucleic acid encoding transferrin signal sequence linked to the nucleic acid encoding the transferrin or transferrin half-molecule.

30. An eukaryotic expression vector of claim 28, wherein the single lobe is the amino terminal lobe of human serum transferrin.

31. An eukaryotic expression vector of claim 28, wherein the single lobe is the carboxy terminal lobe of human serum transferrin.

32. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin mutant, said encoded mutant having at least one of Asn413 and Asn611 of SEQ ID NO:2 mutated to an amino acid which does not allow glycosylation.

33. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin C-terminal lobe mutant, said encoded mutant having at least one of Asn413 and Asn611 of SEQ ID NO:2 mutated to an amino acid which does not allow glycosylation.

34. The vector of claim 33, wherein the encoded C-terminal lobe comprises amino acids 343-679 of SEQ ID NO:2.

35. The vector of claim 32 or 33, wherein the encoded mutant has at least one of Asn413 and Asn611 of SEQ ID NO:2 mutated to an aspartic acid.

36. The vector of claim 32 or 33, wherein the encoded mutant has Asn413 and Asn611 of SEQ ID NO:2 mutated.

37. The vector of claim 36, wherein the encoded mutant has Asn413 and Asn611 of SEQ ID NO:2 mutated to aspartic acid.

38. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin mutant having a mutation in at least one amino acid residue selected from the group consisting of Asp63, Gly65, Tyr95, Tyr188, His249, Asp392, Tyr426, Tyr517 and His585 of SEQ ID NO:2, wherein the encoded mutant retains the ability to bind metal.

39. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin N-terminal lobe mutant having a mutation at Asp63 or Gly65 of SEQ ID NO:2, wherein the encoded mutant retains the ability to bind metal.

40. The vector of claim 38 or 39, wherein the encoded mutant has Asp63 of SEQ ID NO:2 mutated.

41. The vector of claim 40, wherein the encoded mutant has Asp63 mutated to serine.

42. The vector of claim 38 or 39, wherein the encoded mutant has Gly65 of SEQ ID NO:2 mutated.

43. The vector of claim 42, wherein the encoded mutant has Gly65 mutated to arginine.

44. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin mutant having a mutation at Lys206 or His207 of SEQ ID NO:2, wherein the mutant has a stronger binding avidity for metal than wild-type human serum transferrin.

45. An eukaryotic expression vector comprising a nucleic acid encoding a recombinant human serum transferrin N-terminal lobe mutant having a mutation at Lys206 or His207 of SEQ ID NO:2, wherein the mutant has a stronger binding avidity for metal than wild-type N-terminal lobe of human serum transferrin.

46. The vector of claim 44 or 45, wherein the encoded mutant has Lys206 of SEQ ID NO:2 mutated.

47. The vector of claim 46, wherein the encoded mutant has Lys206 mutated to glutamine.

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48. The vector of claim 44 or 45, wherein the encoded mutant has His207 of SEQ ID NO:2 mutated.

49. The vector of claim 48, wherein the encoded mutant has His207 mutated to glutamic acid.

50. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin mutant having a mutation at Lys206 and His207 of SEQ ID NO:2, wherein the mutant has a stronger binding avidity for metal than wild-type human serum transferrin.

51. An eukaryotic expression vector comprising a nucleic acid encoding a human serum transferrin N-terminal lobe mutant having a mutation at Lys206 and His207 of SEQ ID NO:2, wherein the mutant has a stronger binding avidity for metal than wild-type N-terminal lobe of human serum transferrin.

52. The vector of claim 50 or 51, wherein the encoded mutant has Lys206 mutated to glutamine and His207 mutated to glutamic acid.

53. The vector of claim 38 or 44, wherein the encoded mutant has at least one of Asn413 and Asn611 of SEQ ID NO:2 mutated to amino acid which does not allow glycosylation.

54. The vector of claim 53, wherein the encoded mutant has at least one of Asn413 and Asn611 mutated to aspartic acid.

55. An eukaryotic cell line transfected with the vector of any one of claims 27, 28, 32, 33, 38, 44 and 45.

56. The cell line of claim 55 which is a baby hamster kidney cell line.

57. A method of producing functionally active human transferrin, or a portion or mutant thereof, comprising:

a) culturing the eukaryotic cell of claim 55, under conditions conducive to expression of the encoded transferrin; and

b) recovering the expressed transferrin.

58. The method of claim 57, wherein the vector further comprises an inducible promoter of transferrin operably linked to the transferrin-encoding nucleic acid, said method further comprising inducing the promoter in order to induce expression of transferrin.

59. The method of claim 58, wherein the promoter is the zinc inducible metallothionein promoter.

60. The method of claim 59, wherein the vector is the plasmid pNUT.

REMARKS

Election/Restriction

The Examiner has required restriction to one of the following inventions is required under 35 U.S.C. 121:

Group I: claims 1-13 and 26 drawn to recombinant transferrins, and a culture supplement classified in at least Class 435, subclass 240.31;